

Branch River Smallmouth Bass Survey-2009

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The Branch River Watershed covers 27,683 hectares and lays in northwest Manitowoc County and southern Brown County. It flows southeastward before joining with the Manitowoc River and flowing into Lake Michigan. Past surveys have found that the Branch River supports a good warmwater fishery dominated by smallmouth bass, northern pike and rock bass. A large fish kill in 1999, caused by manure, devastated the fish community in the lower 9.6 km of the river.

The purpose of the study described in this report was to determine the status of smallmouth bass in the Branch River. Survey segments were randomly selected using protocols developed for Tier 1 monitoring of Wisconsin smallmouth bass waters. Actual survey locations were selected based on professional judgment, past survey locations and management need. In addition to collecting fish, we measured other variables including air and water temperature, dissolved oxygen, percent oxygen saturation, and flow. Habitat was qualitatively rated.

Survey results indicate that the Branch River contains a diverse warmwater fish community. Stream water temperature, DO and habitat are good to excellent and continue to reflect the Exceptional Water Resource designation for the river. Smallmouth bass dominate lower and middle sections of the river, while northern pike are found in upper sections. Both populations have slowly recovered from the 1999 fish kill, but overall number and size structure still have not completely recovered.

INTRODUCTION

The Branch River Watershed covers 27,683 hectares, and lays in northwest Manitowoc County (61%) and southern Brown County (39%). It flows southeastward before joining with the Manitowoc River and flowing into Lake Michigan. In the Branch River Watershed, agriculture (70.1%) is the primary land use followed by water and wetlands (Table 1). Within the watershed, there are 10 streams that cover 98.1 kilometers (WDNR 2001).

Table 1. Land use in the Branch River by county in hectares.

Land Use	Brown County	Manitowoc County	Total Acreage	Percent
Agriculture	7,584	11,862	19,446	70.1
Non-Cropland	464	726	1,191	4.3
Open Water and Wetlands	1,553	2,428	3,981	14.4
Woodland	895	1,400	2,294	8.3
Other	301	471	771	2.9
Total	10,797	16,887	27,683	100

Of the 70.8 kilometers of streams that have been classified, 50.7 km are warmwater sport fish (WWSF) streams, 10.5 km are coldwater streams and 8.8 km of limited forage fish (LFF) streams. Seven streams covering 27.4 km miles have not been formally classified and have been assigned the default classification of WWSF. In addition, the lower Branch River is classified as an Exceptional Water Resource (EWR).

Many fish surveys have been conducted on the Branch River since 1960. Schultz (1960) and Threinen (1962) each noted low gamefish populations and attributed this fact to extensive pasturing of cattle in and near the Branch River that had led to erosion that filled in pool habitat. Smallmouth bass and northern pike were the dominant gamefish they captured.

Belonger (1975) and Peeters (1984) each surveyed the lower section of the Branch River to assess the fish community. Belonger captured a diverse assemblage of warmwater fish that was dominated by rock bass, smallmouth bass, common shiner, longnose dace and white sucker. Peeters noted during his survey that Lake Michigan trout and salmon were using the Branch River during migratory runs.

Hogler (1999), while investigating a manure spill that resulted in a fish kill that devastated the lower 9.6 km of the Branch River, counted thousands of dead fish and crayfish. Most of the dead fish were forage species, but he also noted a substantial number of dead smallmouth bass, northern pike, white sucker and Chinook salmon.

Study Rationale

The purpose of the study described in this report was to determine the status of smallmouth bass in the Branch River by using the Index of Biotic Integrity (IBI) (Lyons 1992) and catch per effort (CPE) data. By quantifying the type and number of fish species, we can judge the current condition of the fish population in the stream, compare results to previous stream surveys and compare that stream to other streams across the state.

METHODS

Survey segments were randomly selected using protocols developed for Tier 1 monitoring of Wisconsin smallmouth bass waters. Actual survey locations were selected based on professional judgment, past survey locations and management need. Each site was 800 meters in length. Fish were collected in a single upstream pass using a standard stream shocker with three anodes. All fish were netted, identified, counted. Gamefish length was measured to the nearest millimeter.

Other variables that were measured while on site included air and water temperature, dissolved oxygen, percent oxygen saturation, and flow. Habitat was qualitatively rated (Simonson et al 1994). Qualitative scores can range from 0 to 100 with scores less than 25 indicating poor habitat, 25 to 49 fair habitat, 50 to 74 good habitat and scores above 74 indicating excellent habitat. Within the scoring matrix, items that are rated include buffer width, bank erosion, pool depth, stream width to depth ratio, riffle to riffle distances, fine sediment coverage and cover for fish. Streams that score high on the rating index have diverse habitats, deep pools and no erosion. Streams that score low include those that have limited buffers, shallow water, erosion, sediment deposition and little fish habitat.

Gradient and sinuosity were determined by using GIS and map measuring tools to determine the value of these variables.

The Index of Biotic Integrity (IBI) based on the fish community at each sampling location was calculated using an excel spreadsheet for warmwater communities. IBI scores can range from 0 (poor) to 100 (excellent). Fish communities that receive poor IBI scores have many species that are tolerant to low dissolved oxygen levels or disturbed habitat while streams with high scores have many warmwater gamefish and species intolerant to habitat disturbances. All sampling was conducted in July and August of 2009.

RESULTS

Three locations were selected as survey sites for this study and all were within the stream reach identified as smallmouth bass waters. The selected sites were upstream of North Union Road, Danmar Road and Reifs Mill Road (Figure 1).

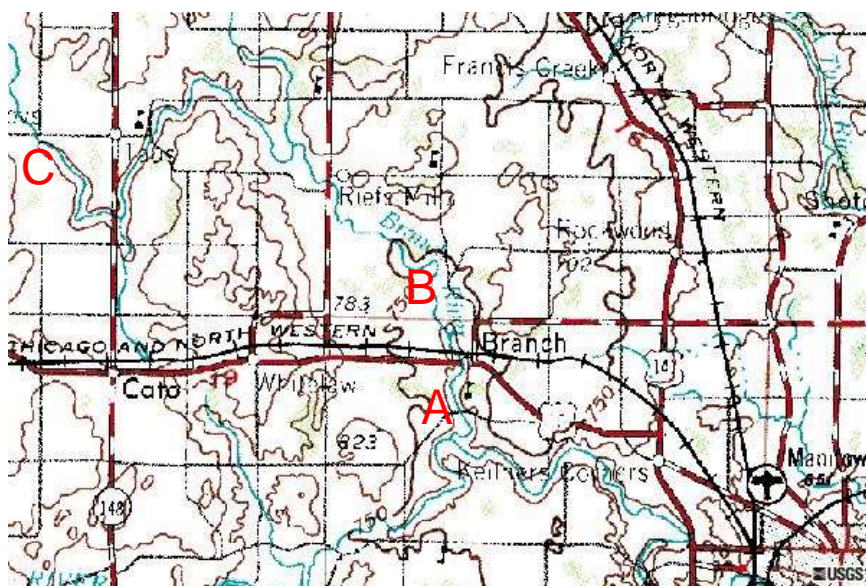


Figure 1. The location of our survey sites on the Branch River that were sampled in 2009 to assess the smallmouth bass population of the river. Site A was upstream of North Union Road, site B was upstream of Danmar Road and site C was upstream of Reifs Mill Road.

North Union Road

The Branch River at this location is a 4th order stream that runs through a private golf course. However, the stream banks are well buffered with trees, shrubs and non-mowed grasses (Figure 2). Average stream width at this location is 25 meters and several sections of river have been channelized (10%) and rip-rapped near golf course crossings. The stream has a gradient of 1.98 meters per kilometer and a sinuosity of 1.57:1.



Figure 2. The Branch River runs through golf course at North Union Road, although stream banks are well buffered.

This site was surveyed on July 22 during morning hours. At the time of survey, the air temperature was 17° C, the water temperature was 18.6° C, and the stream dissolved oxygen (DO) was 96.1% saturated at 9.00 mg/l.

The water level in the stream was judged to be normal for the time of year and the water was clear. Flow was measured at 0.224 cubic meters per second (CMS).

During the 62 minutes of shocking that covered 800 meters, we netted 1,348 individual fish representing 17 species (Table 2). Common shiner and hornyhead chub dominated the catch with substantially fewer individuals of other species captured. The mixture and abundance of species that were captured resulted in an IBI score of 57. That score indicated that at this location there was a good warmwater fish community.

Table 2. Species abundance of fish captured during electroshocking on the Branch River upstream of North Union Road.

Species	Number
Common Shiner	881
Hornyhead Chub	131
Rosyface Shiner	77
Largescale Stoneroller	60
Smallmouth Bass	58
Rock Bass	26
Johnny Darter	24
Creek Chub	19
Blacksided Darter	15
Blacknose Dace	14
Sand Shiner	14
Longnose Dace	14
White Sucker	8
Bluntnose Minnow	3
Northern Pike	2
Brown Trout	1
Green Sunfish	1
Total	1,348

We netted 58 smallmouth bass during shocking for a CPE of 7.25 bass per 100 meters shocked. The bass ranged in length from 43 mm to 400 mm and had an average length of 176 mm (Table 3). The two northern pike that we captured averaged 453 mm in length. We also captured a single 332 mm brown trout that was not fin clipped.

The 26 rock bass that we captured ranged from 122 mm to 197 mm in length and had an average length of 150 mm (Table 3). In addition, a single 133 mm green sunfish was captured.

Table 3. The length frequency of fish captured during electroshocking on the Branch River upstream of North Union Road.

Length (mm)	Smallmouth Bass	Northern Pike	Rock Bass	Brown Trout	Green Sunfish
40	4				
50	2				
60	1				
70					
80					
90					
100	1				
110	5				
120			5		
130			6		1
140	1		3		
150	1		3		
160	6				
170	8		5		
180	9		3		
190	6		1		
200	1				
210	2				
220	3				
230	2				
240					
250	1				
260					
270					
280	1				
290					
300	1				
310	1				
320	1				
330				1	
340					
350					
360					
370					
380					
390					
400	1				
410					
420		1			
430					
440					
450					
460					
470					
480		1			
Number	58	2	26	1	1
Ave. Len.	176	453	150	332	133
S.D.	70.05	38.89	23.69	--	--

Following shocking, staff evaluated stream habitat using the qualitative habitat scoring sheet. At this location, the river had high rankings for buffer width, limited bank erosion and diverse habitat. It scored somewhat lower because the survey section lacked deep runs. Overall the stream at this location scored 77 points indicating very good qualitative habitat.

Danmar Road

At Danmar Road, the Branch River is a 4th order stream that flows through a woodland landscape (Figure 3). The Branch River at this location has a gradient of 1.59 meters per kilometer and a sinuosity of 1.46:1.



Figure 3. The Branch River runs through woodland above Danmar Road.

When we surveyed this location on August 5, the air temperature was 16° C, the water temperature was 18.4° C and DO was 97.4% saturated at 9.17 mg/l. The water was clear and the water level was judged to be normal or lightly less than normal (<0.1 m) for this time of year. Flow was measured at 0.11 CMS.

During 58 minutes of shocking, we captured 2,269 individual fish representing 19 species (Table 4). Common shiner dominated the catch. Fish of other species were collected in much lower number. The gamefish species that we captured included smallmouth bass and northern pike. The only panfish that was captured was a single rock bass. The mixture and abundance of species that were captured resulted in an IBI score of 52. That score indicated that at this location there was a good warmwater fish community.

The 36 smallmouth bass captured ranged in length from 25 mm to 350 mm with an average length of 189 mm (Table 5). CPE for bass was 4.5 per 100 meters shocked. Several year classes appear to be present in the sample. Northern pike ranged in length from 152 mm to 205 mm in length and had an average length of 181 mm. Pike CPE was 0.8 per 100 meters shocked.

Table 4. Species abundance of fish captured during electroshocking on the Branch River upstream of Danmar Road.

Species	Number
Common Shiner	1,349
Hornyhead Chub	327
Johnny Darter	158
White Sucker	113
Sand Shiner	72
Largescale Stoneroller	56
Blackside Darter	47
Smallmouth Bass	36
Creek Chub	30
Rosyface Shiner	25
Longnose Dace	13
Southern Redbelly Dace	11
Blacknose Dace	9
Stonecat	7
Bluntnose Minnow	6
Northern Pike	6
Central Mudminnow	4
Black Bullhead	2
Rock Bass	1
TOTAL	2,269

Stream habitat using the qualitative habitat scoring sheet was evaluated following shocking. At this location, the river had high rankings for buffer width and limited bank erosion. The site scored somewhat lower because of shallow depth. Overall, the stream at this location scored 82 points indicating excellent qualitative habitat for warmwater fish.

Table 5. The length frequency of fish captured during electroshocking on the Branch River upstream of Danmar Road.

Length (mm)	Smallmouth Bass	Northern Pike	Rock Bass	Black Bullhead
20	1			
30				
40				
50	2			
60	1			
70	1			
80				
90				
100				
110				
120				
130				
140				
150	1	1		
160				
170		2		1
180	2		1	1
190	2	2		
200	6	1		
210	3			
220	5			
230	3			
240				
250	1			
260	1			
270	1			
280				
290				
300				
310				
320				
330				
340				
350	1			
Number	31	6	1	2
Ave. Len.	189	181	180	178
S.D.	73.24	19.09	--	8.49

Reifs Mill Road

At this location, the Branch River is a 3rd order stream that flows through an agricultural landscape with a forest, shrub and grass buffer (Figure 4). Stream width at this location varied between 10 m and 20 m wide, the gradient was 0.53 meters per kilometer and the river had a sinuosity of 2.25:1.



Figure 4. Looking upstream at the Branch River from Reifs Mill Road.

When we surveyed this location on July 28, the air and water temperature was 21° C and DO was 117.7% saturated at 10.5 mg/l. The water was clear and judged to be at normal level for this time of year. Flow was measured at 0.10 CMS.

During the 65 minutes of shocking, we captured 3,976 individual fish representing 16 species (Table 6). Common shiner dominated the catch with substantially fewer individuals of other species captured. The most common gamefish captured were northern pike and the most common panfish was rock bass. The mixture and abundance of species that were captured resulted in an IBI score of 52. That score indicated that at this location there was a good warmwater fish community.

The 22 northern pike that we captured ranged in length from 122 mm to 470 mm and had an average length of 219 mm (Table 7). CPE for northern pike was 2.75 per 100 meters shocked. Most pike were captured along the stream margin in overhanging vegetation. The single smallmouth bass captured was 210 mm in length resulting in a bass CPE of 0.13 per 100 meters shocked.

Rock bass ranged in length from 49 mm to 184 mm and had an average length of 121 mm.

Table 6. Species abundance of fish captured during electroshocking on the Branch River upstream of Reifs Mill Road.

Species	Number
Common Shiner	3,073
Hornyhead Chub	395
Blackside Darter	183
White Sucker	94
Mottled Sculpin	73
Creek Chub	47
Rock Bass	45
Northern Pike	22
Central Mudminnow	21
Southern Redbelly Dace	9
Stonecat	6
Shorthead Redhorse	3
Largescale Stoneroller	2
Bluntnose Minnow	1
Johnny Darter	1
Smallmouth Bass	1
TOTAL	3,976

Stream habitat using the qualitative habitat scoring sheet was evaluated following shocking. At this location, the river had high rankings for buffer width and limited bank erosion. The site scored somewhat lower for shallow depth, limited fish cover and the lack of pools. Overall, the stream at this location scored 58 points indicating good qualitative habitat for warmwater fish.

Figure 7. The length frequency of fish captured during electroshocking on the Branch River upstream of Reifs Mill Road.

Length (mm)	Smallmouth Bass	Northern Pike	Rock Bass
40			1
50			3
60			4
70			3
80			3
90			2
100			6
110			2
120		2	2
130		4	2
140		1	5
150		3	9
160		1	1
170		5	3
180			2
190			
200			
210	1		
220			
230			
240			
250			
260			
270			
280			
290			
300			
310			
320			
330			
340		1	
350		1	
360			
370		1	
380		1	
390			
400			
410			
420			
430			
440			
450			
460			
470		2	
Number	1	22	48
Ave. Len.	210	219	121
S.D.	--	116.67	39.82

DISCUSSION

Following Wisconsin sampling protocols, we surveyed three sites on the Branch River to assess the smallmouth bass population of the river. The work in 2009 was similar to work that was completed in 2005 (Hogler et al 2009). In addition to electrofishing to assess the fish population at each site, we measured DO, flow and qualitatively assessed habitat.

Temperature and Dissolved Oxygen

At each of the 3 sites, measured dissolved oxygen levels and water temperatures were adequate to support smallmouth bass populations. The results from 2009 were similar to those measured at Danmar Road in 2005 (Hogler et al 2009). Water temperature and DO in the Branch River continue to be supportive warmwater gamefish populations.

Flow

Similar to temperature and DO, measured flow in 2009 was very similar to what was measured in 2005 although flow in 2005 was slightly higher than in 2009 (Hogler et al 2009). The lower 2009 flow does not appear to limit the diversity of warmwater fish in the river.

Habitat

Habitat in 2009 was assessed qualitatively at each of the survey sites. Scores indicate that habitat for warmwater fish range from good to excellent in the Branch River. Although the Branch River in some locations lacks pool depth and is too wide for its size (because of past and current landuse practices), habitat for smallmouth bass is not limited. However, habitat for northern pike appears to be somewhat limited. Most of the northern pike captured during this survey was associated with either woody debris or overhanging vegetation. At the sites that we surveyed, this type of habitat was rare and limited to small portions of the survey section. Also lacking was wetland habitat generally associated with the stream corridor that northern pike utilize for spawning. The lack of these types of pike habitat that we noted in our survey sections could be due to the type of sites we monitored (bass not pike). It also could be associated with long term loss of wetland and limited recruitment of large woody debris because of land clearing practices utilized by agriculture.

Fish Populations

The fish population of the Branch River is a diverse warmwater community and IBI scores reflect the quality of this stream. Smallmouth bass can be found in much of the river located in Manitowoc County. Bass, below Highway J including the sites at North Union Road and Danmar Road, are the dominant gamefish of the stream. This section of river has favorable water temperatures, good DO and diverse habitat for all life stages although pools may be too small and shallow for the largest adults.

Upstream of Highway J including the site at Reifs Mills Road, the river gradient declines, habitat is less diverse, there are fewer deep holes and water temperature is warmer. This is a transition zone where smallmouth bass and

northern pike co-exist. In upper river sections found in Brown County, northern pike likely dominate the gamefish community.

Smallmouth bass abundance and the diversity of other fish noted during the 2009 survey were similar to those observed by Schultz (1960), Belonger (1975) and Hogler et al (2009). The size distribution of smallmouth bass noted in 2009 was similar to the sizes measured during baseline work in 2005 (Hogler et al 2009), however during earlier surveys, larger bass were more consistently captured. It is likely the fish kill in 1999 (Hogler 1999) removed most of the bass population in the surveyed sections of river and the bass population has been slow to recover.

Like the smallmouth bass population, the northern pike population was similar to what was seen in 2005, but the number and size of fish were smaller than during pre-1999 surveys. In areas of the river that still have suitable spawning habitat, northern pike are doing well but overall their population is down from previous surveys. Likely the 1999 fish kill, man made barriers and the loss of spawning habitat has negatively impacted the pike population in the river.

We also noted the lack of a diverse redhorse species community. Before the 1999 fish kill, it was common to see several species of redhorse, including greater redhorse during earlier surveys. Since 1999, we have only captured limited numbers of redhorse and have not seen any greater redhorse. It is not clear why this trend is occurring.

We were also surprised about the lack of rock bass and other panfish in our catches. Rock bass were only commonly captured at our most upstream site with few captured at the other locations. Earlier surveys Schultz (1960) and Belonger (1975) commonly captured panfish in many locations in the Branch River. The cause of the decline is not known; but likely causes for the decline include the lack of pool habitat, a slow recovery from the 1999 fish kill and perhaps from high angler harvest or predation from gamefish.

SUMMARY

- The Branch River contains a diverse warmwater fish community. Stream water temperature, DO and habitat are good to excellent and continue to reflect the Exceptional Water Resource designation for the river.
- Smallmouth bass dominate lower and middle sections of the river. Bass populations have begun to recover following the 1999 fish kill, but lack larger, older fish.
- Northern pike are spawning successfully in the river. The pike population is also slowly recovering following the 1999 kill.

RECOMMENDATIONS

- Continue to monitor the smallmouth bass and northern pike fish communities to ensure recovery from the 1999 fish kill continues.
- Work with land owners and the Counties to protect, enhance and restore wetlands and grasslands along the river to improve northern pike populations.
- Actively utilize streambank protection programs (CRP, CREP) to maximize stream bank protection in those streams that exhibit bank erosion.
- Encourage practices to reduce the delivery of sediment and nutrients to basin streams and lakes.
- Encourage the use of land practices that hold and slowly release water into streams to improve stream flows.

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